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HIGH FIELD MR CAROTID VESSEL WALL IMAGING: REPRODUCIBILITY OF FIVE DIFFERENT MR WEIGHTINGS

ACC Poster Contributions
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Background: Magnetic Resonance (MR) Imaging has emerged as promising noninvasive imaging modality for serial assessment of the vessel wall in the carotid artery as an early marker of atherosclerosis. Therefore, Scan-Rescan reproducibility is paramount. This study investigates Scan-Rescan reproducibility of 5 MR weightings and investigates which of the weightings best approximates the reference standard (combination of the commonly used weightings).

Methods: Five healthy volunteers (60% male, mean age=28yrs) underwent repeated MR-examinations (3T-Philips-MRI) of the left carotid artery with 5 weightings (table1). A standard phased-array coil with two flexible elements of 14×17cm was used to obtain nine transverse imaging sections of the left carotid artery with identical in-plane resolution (0.46×0.46mm2). Scan-Rescan analysis was performed in a slice of the common carotid artery.

Vessel wall area and lumen area were assessed by one blinded observer using dedicated software (Vessel Mass) for the 5 weightings and compared with the rescan. Furthermore, the 5 weightings were compared with the reference standard.

Results: Highest reproducibility was found for the T1-TFE and T2-TSE (table 1). T1-TFE approximated best the reference standard (lumen, r=0.97; vessel wall, r=0.90).

Conclusions: In high field carotid vessel imaging T1-TFE and T2-TSE showed best Scan-Rescan reproducibility of 5 different MR-weightings. T1-TFE showed highest correlation to the reference standard.

Table 1a

Scan-Rescan Reproducibility for the Common Carotid Artery.

	Lumen Area (mm2)					Vessel Wall area (mm2)				
	R	mean	p	SD	COV (%)	R	mean	p	SD	COV (%)
T1-TFE	0.97	-1.15	0.42	2.91	6%	0.86	1.41	0.01	0.74	3%
T2	0.95	2.03	0.18	2.82	6%	0.96	-1.19	0.20	1.72	7%
PD	0.89	2.75	0.06	2.36	7.5%	0.55	-0.25	0.85	2.82	12%
T1-TSE	0.90	-0.12	0.94	3.45	10%	0.85	-1.70	0.13	2.03	9%
TOF	0.97	0.74	0.43	1.89	5%					

Table 1b

Separate analysis of the MR-weightings compared to the reference standard.

	Lumen Area (mm2)					Vessel Wall area (mm2)				
	R	mean	p	SD	COV (%)	R	mean	p	SD	COV (%)
T1-TFE	0.97	0.57	0.52	1.80	5%	0.90	-0.60	0.18	0.83	3.5%
T2	0.38	-0.76	0.85	8.32	24%	0.52	-1.02	0.42	2.54	11%
PD	0.81	-2.71	0.24	4.39	13%	0.07	-0.50	0.75	3.31	14%
T1-TSE	0.78	-0.69	0.75	4.63	13%	0.64	-2.25	0.15	2.87	13%
TOF	0.84	3.08	0.15	3.88	10%					

TSE, turbo (segmented) spin-echo; FFE, fast field echo(gradient echo); TFE, turbo field echo; FOV, Field of view; TOF, time of flight; R, Pearson's correlation coefficient; P, p-value of T-test; SD, standard deviation; COV, coefficient of variation